

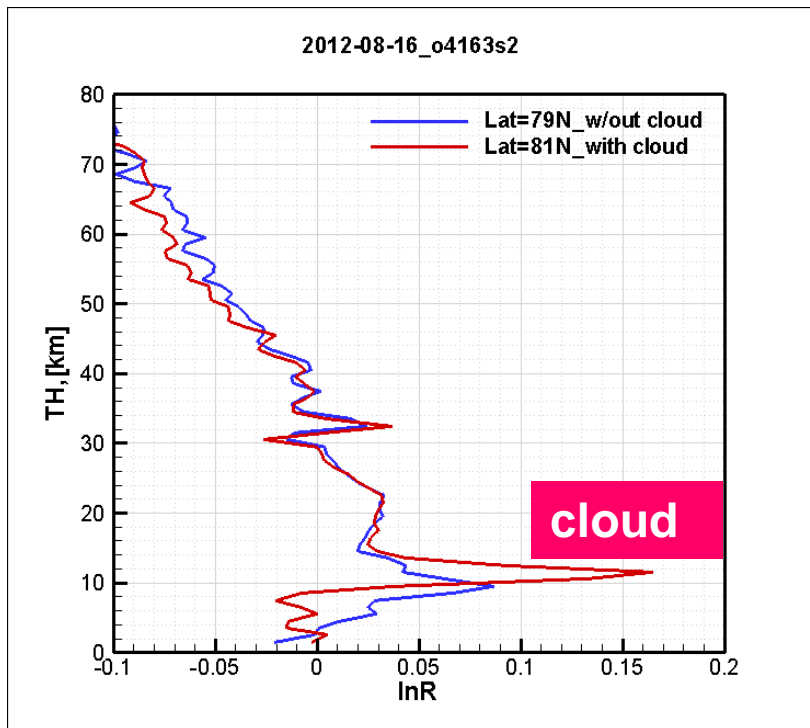
A New Algorithm for Detecting Cloud Height using OMPS/LP Observations

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Methodology

We use a differential edge detection algorithm. The algorithm assumes that clouds produce a sharper vertical gradient in radiances than aerosols, and that the spectral dependence of radiances is larger for clouds due to their larger particle size.



Cloud Index Ratio is defined as

$$\ln R = d\ln I_m(\lambda_1, z)/dz - d\ln I_m(\lambda_2, z)/dz$$

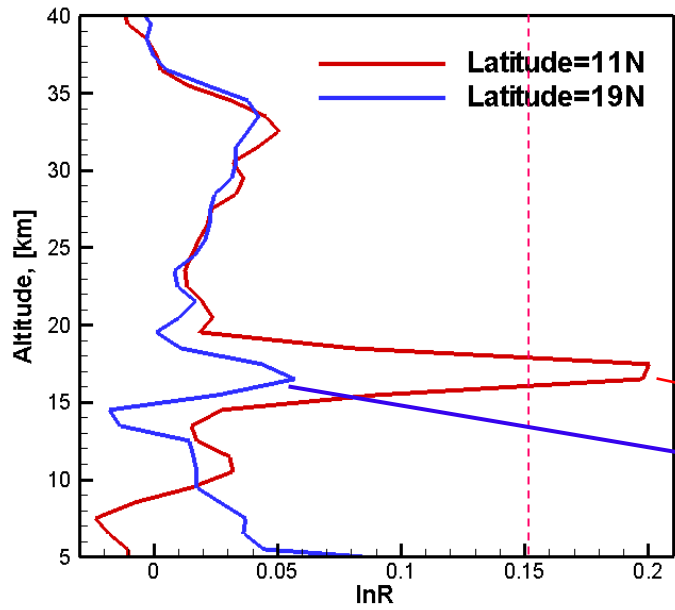
where I_m is the limb radiance as a function of wavelength λ and tangent height z .

The following wavelengths are used:

$$\lambda_1 = 674 \text{ nm}$$

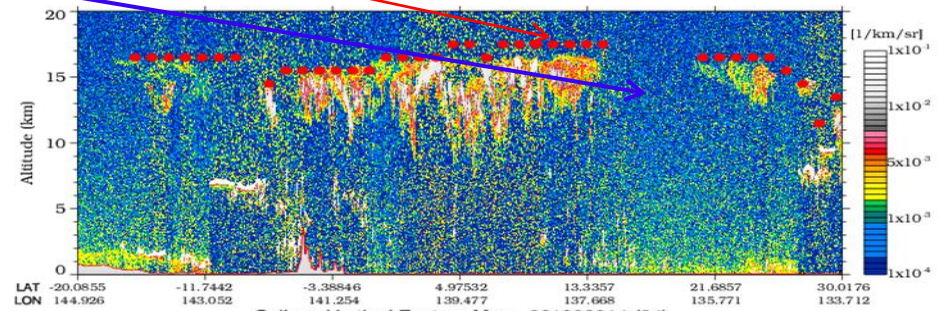
$$\lambda_2 = 868 \text{ nm}$$

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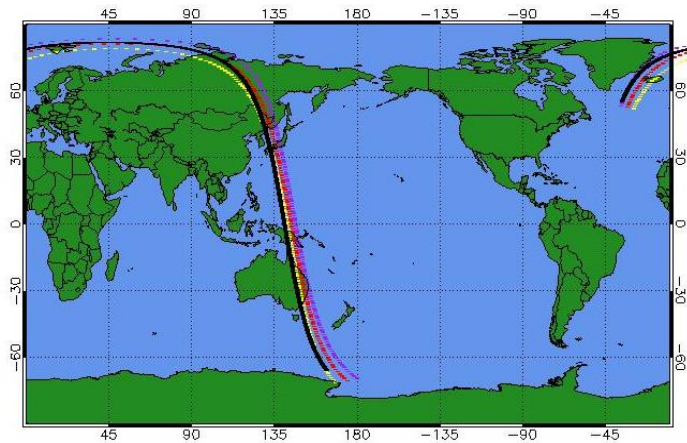
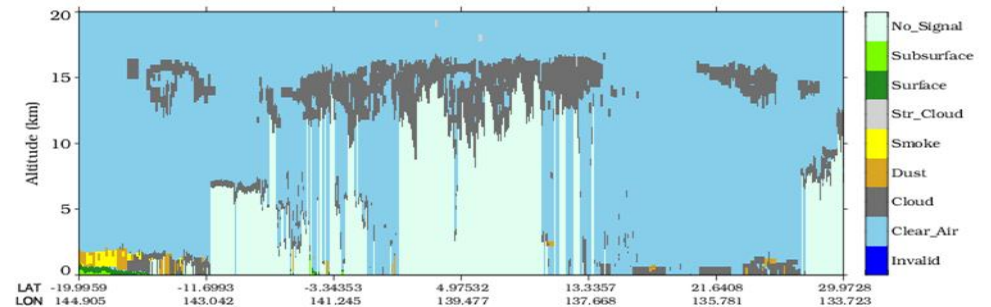


Threshold Determination

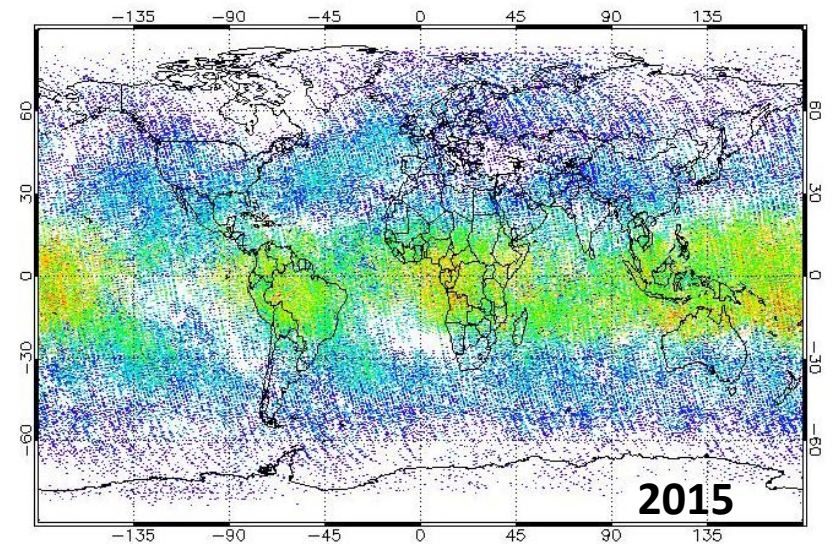
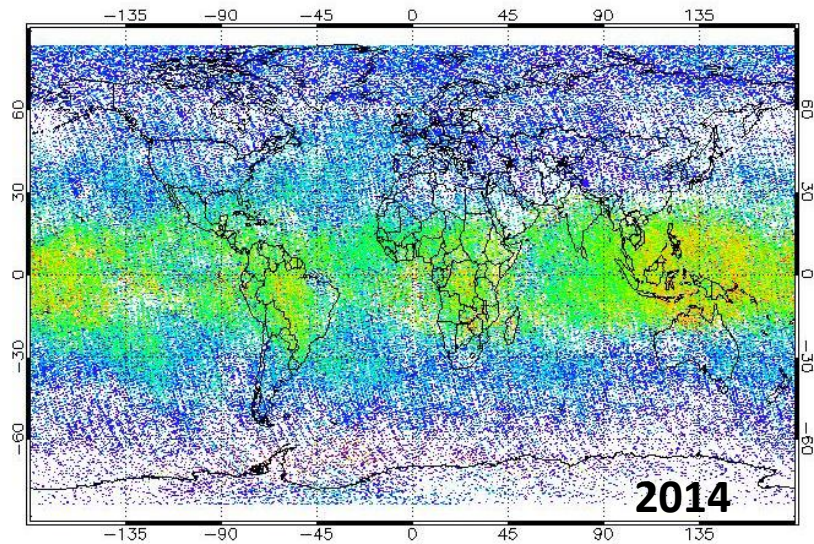
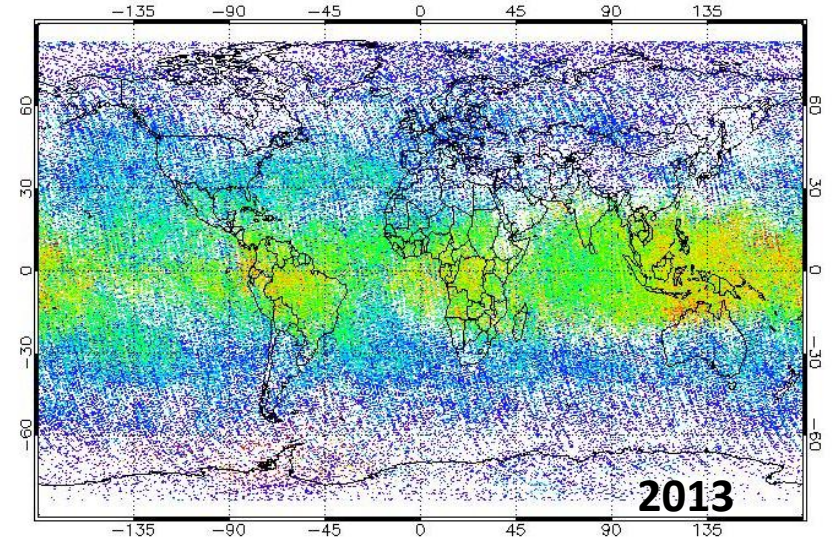
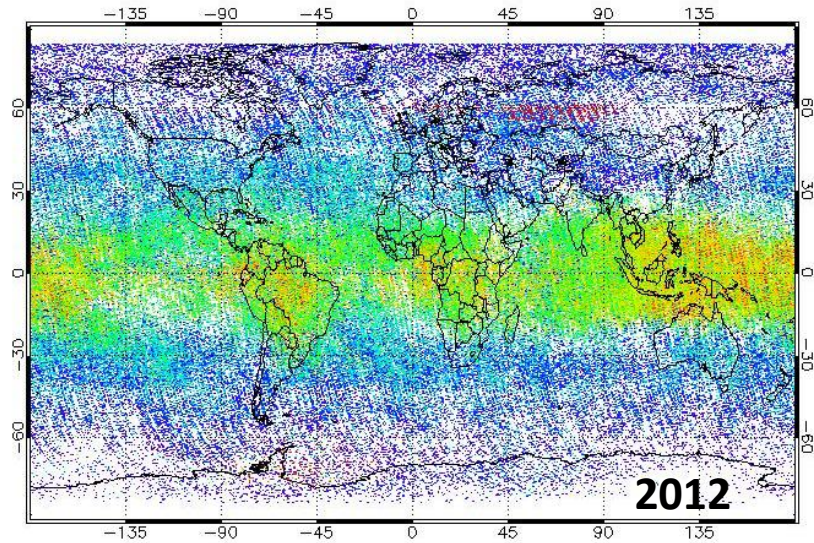
532-nm Attenuated Backscatter20140619 (04)



Calipso Vertical Feature Map, 061902014 (04)



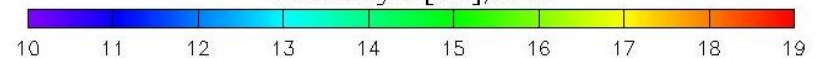
Global Maps of LP Cloud Height



CloudHeight [km],2014

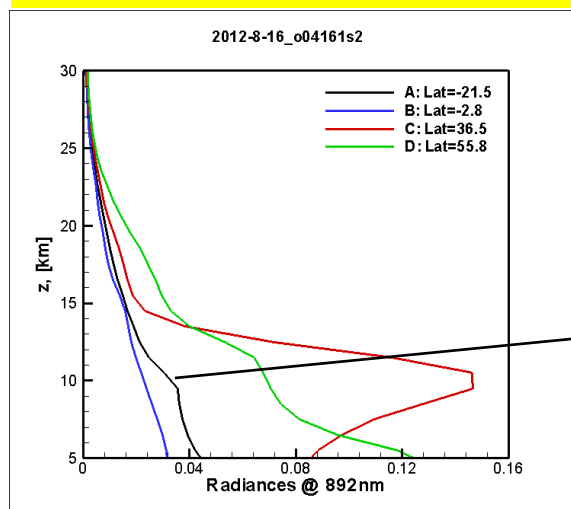


CloudHeight [km],2015



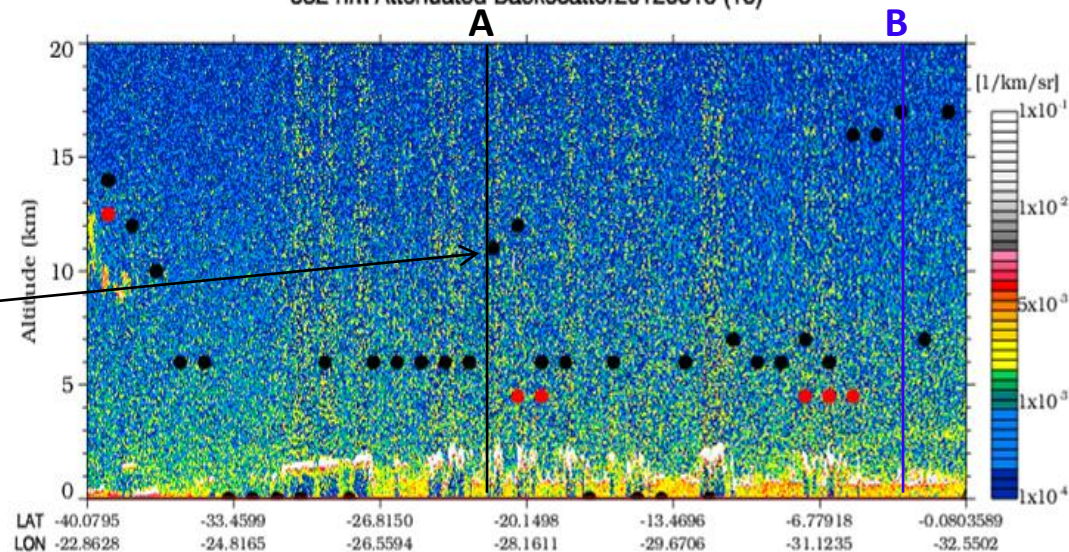
Comparison between two cloud detection algorithms

Old algorithm checks 'abrupt' change in radiances

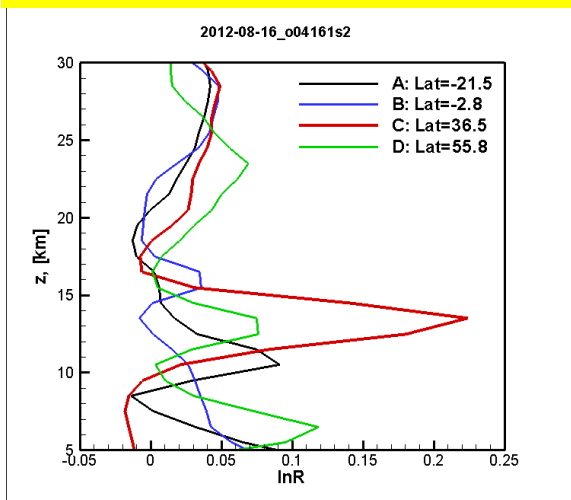


Black circle: Old algorithm
Red circle: New algorithm

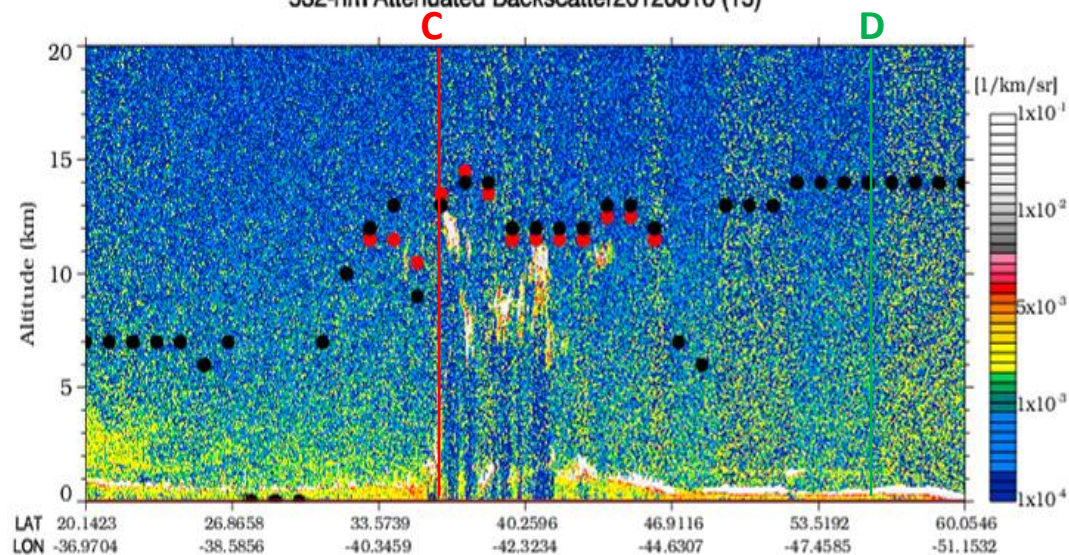
532-nm Attenuated Backscatter20120816 (15)



New algorithm uses a differential edge detection technique

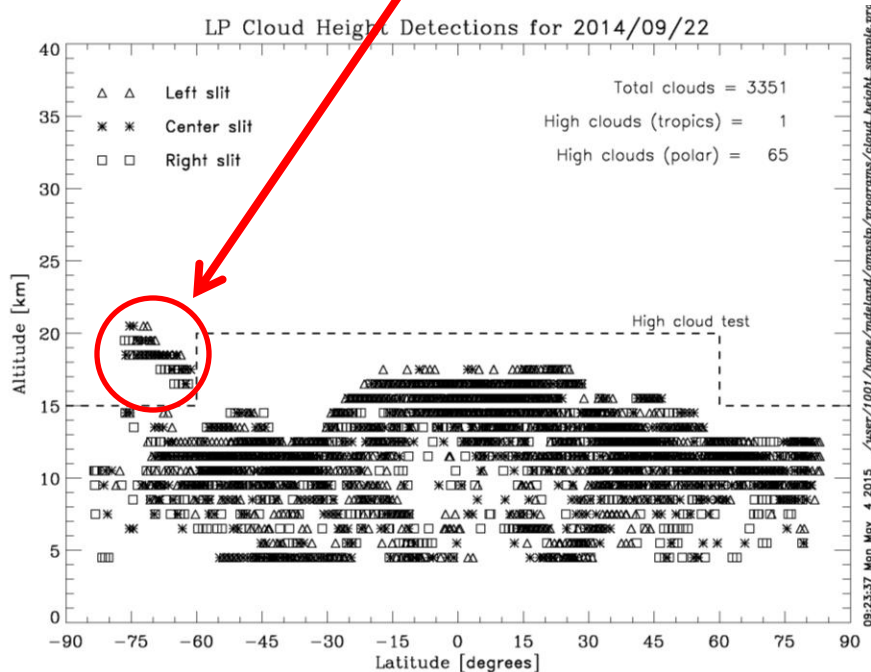


532-nm Attenuated Backscatter20120816 (15)

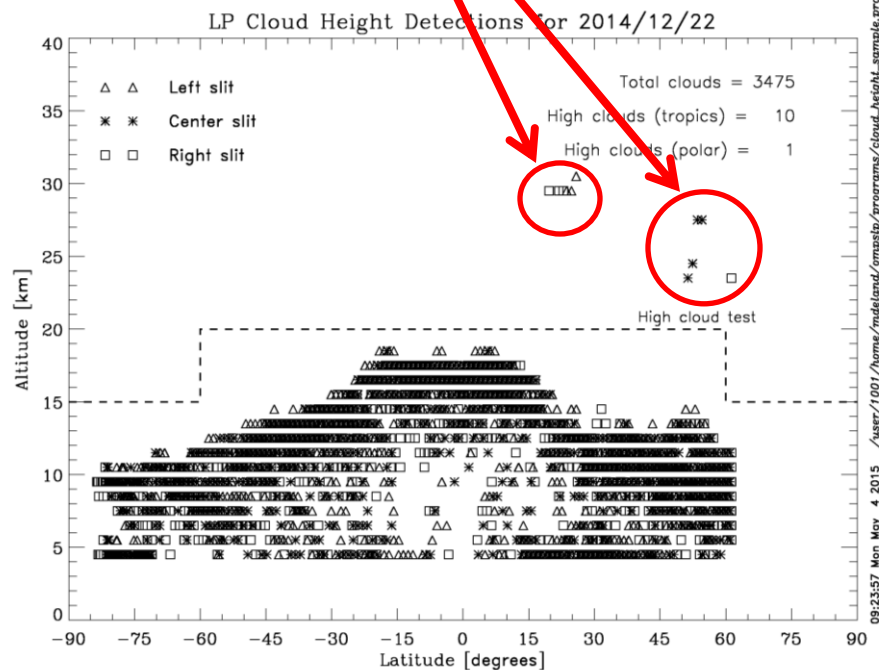


Examples of High Clouds in Current LP Product

9/22/2014 – Polar stratospheric clouds in Southern Hemisphere

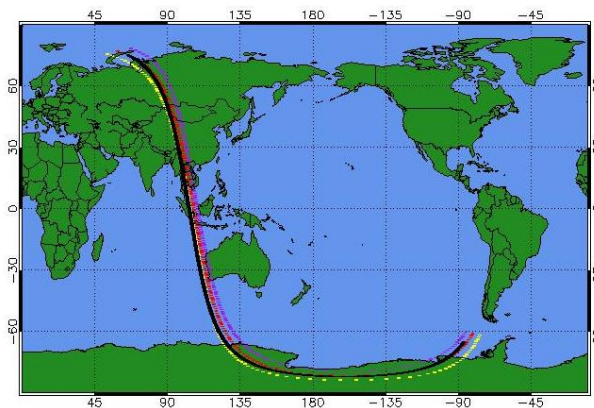
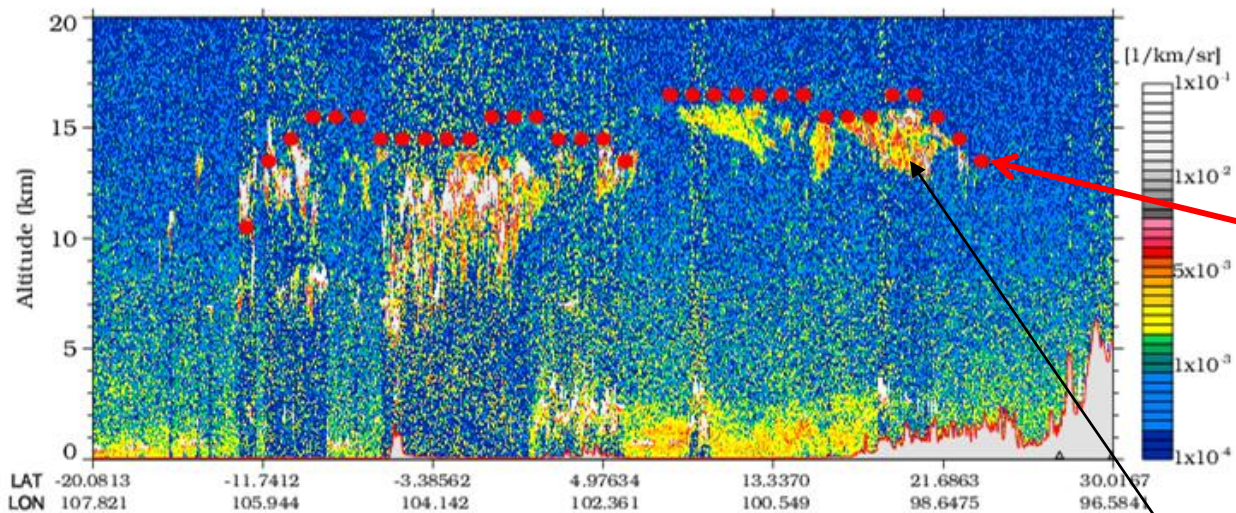


12/22/2014 – Upper edge of Junge layer in Northern Hemisphere?



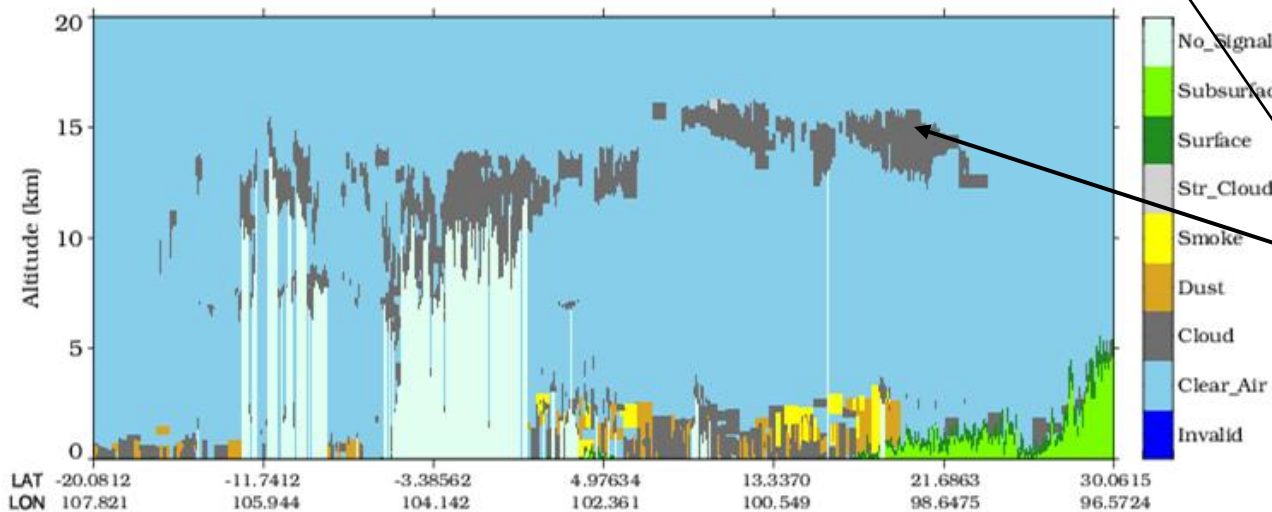
Comparing LP cloud height with CALIOP data

532-nm Attenuated Backscatter 20150121 (06)



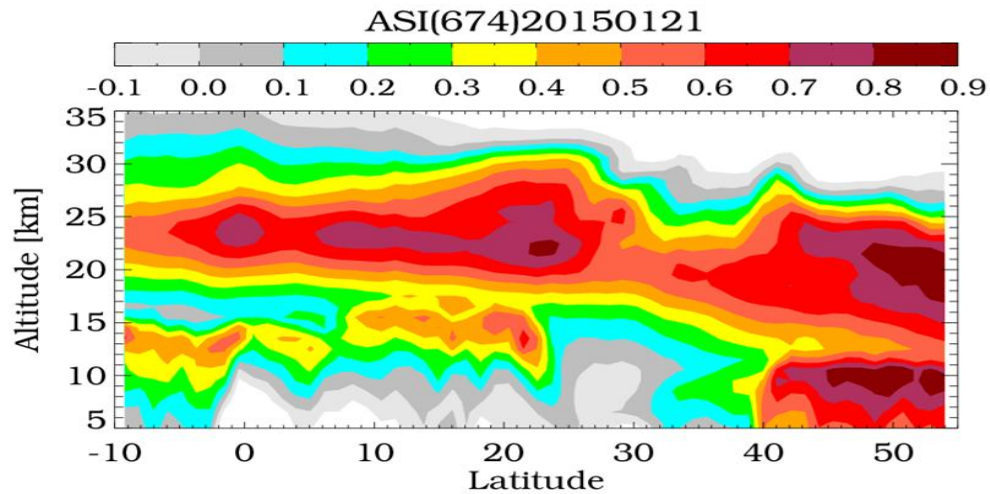
LP Cloud Heights

Calipso Vertical Feature Map, 012102015 (06)

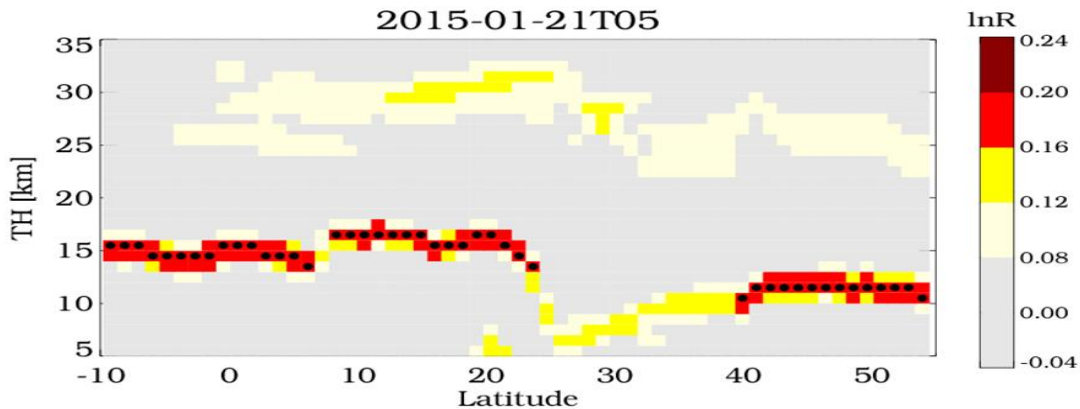


CALIOP Clouds

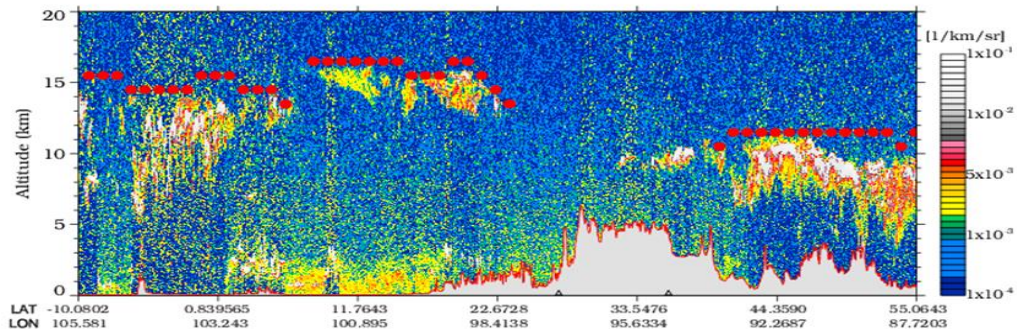
Distinction between Clouds and Aerosols



Aerosol Scattering Index (ASI)



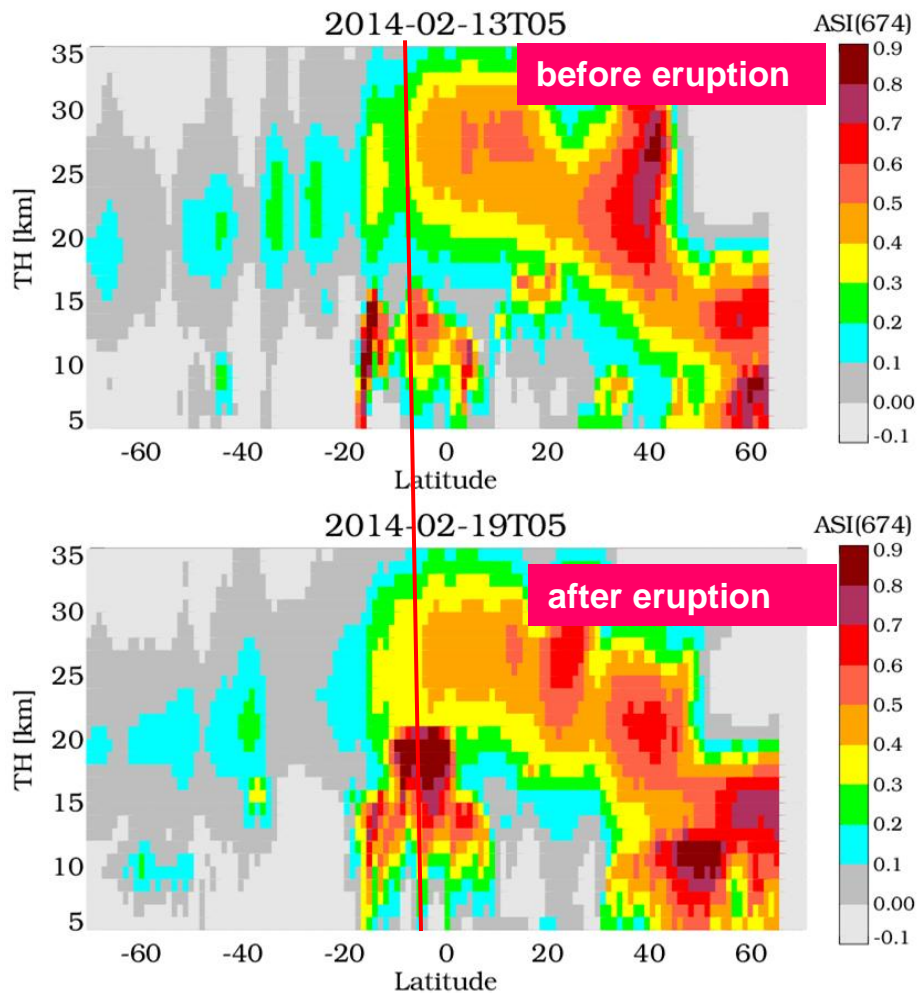
Cloud Index ($\ln R$)



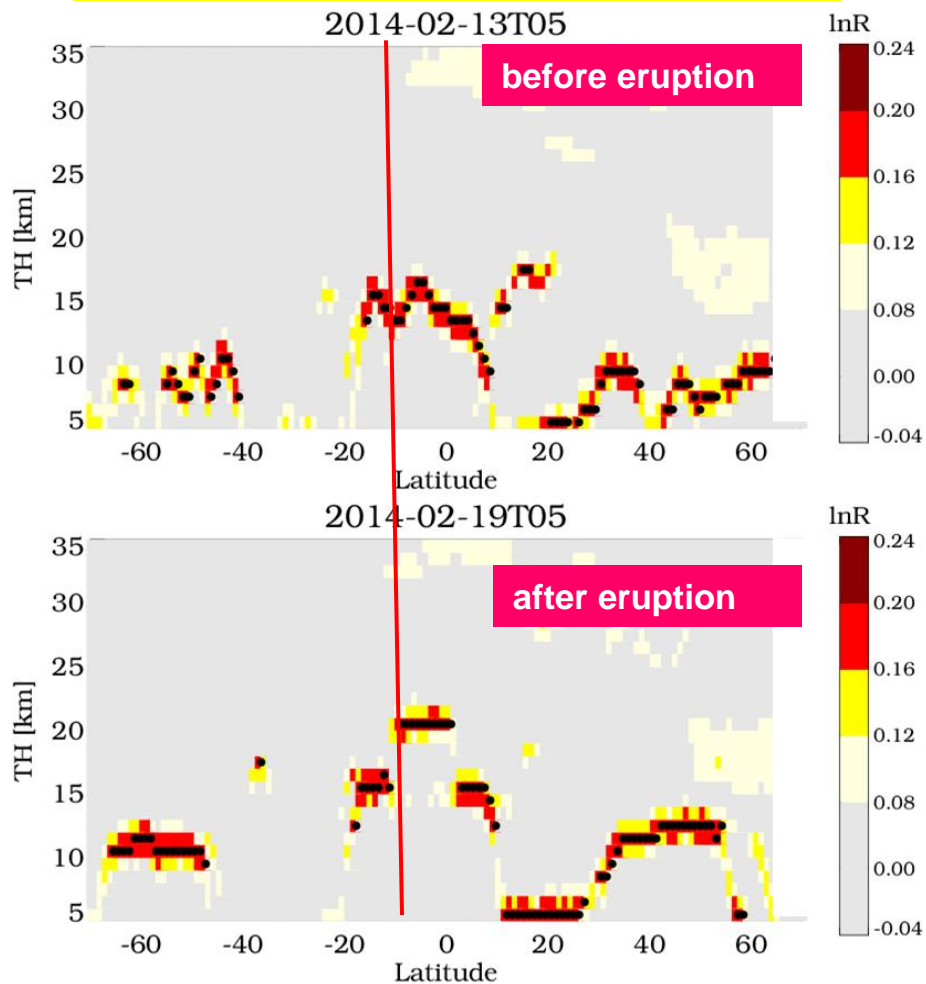
**LP Cloud Height (red dots)
In CALIPSO curtain plot**

Sensitivity of ASI & lnR to volcano eruption on Feb. 13, 2014 at Kelud (Lat = -8°, Lon = 112°)

ASI is sensitive to volcano



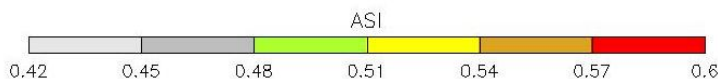
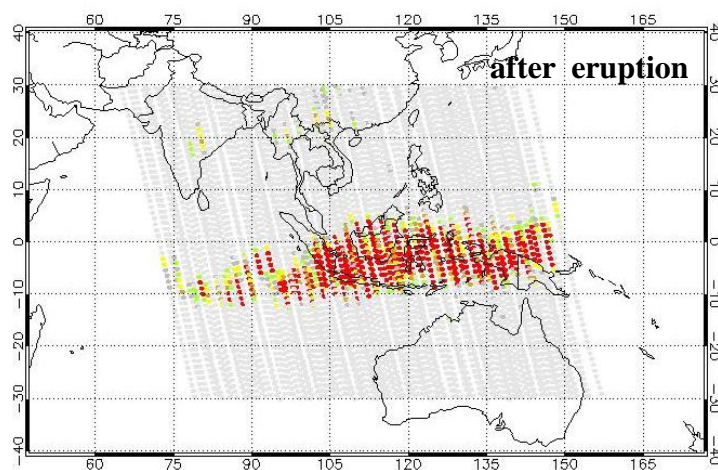
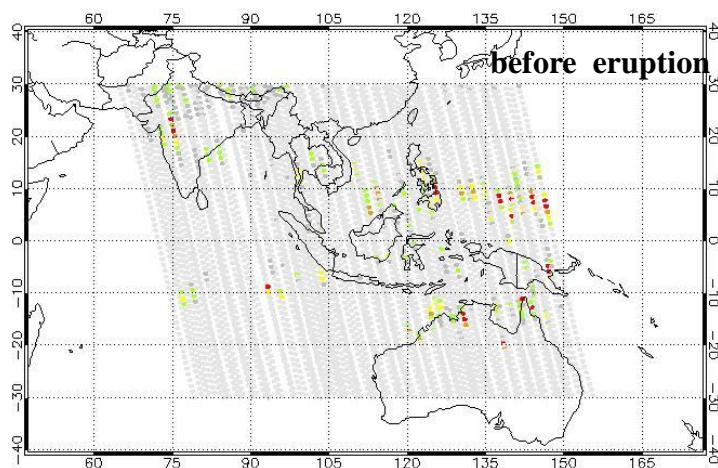
Volcano influences lnR above 20 km



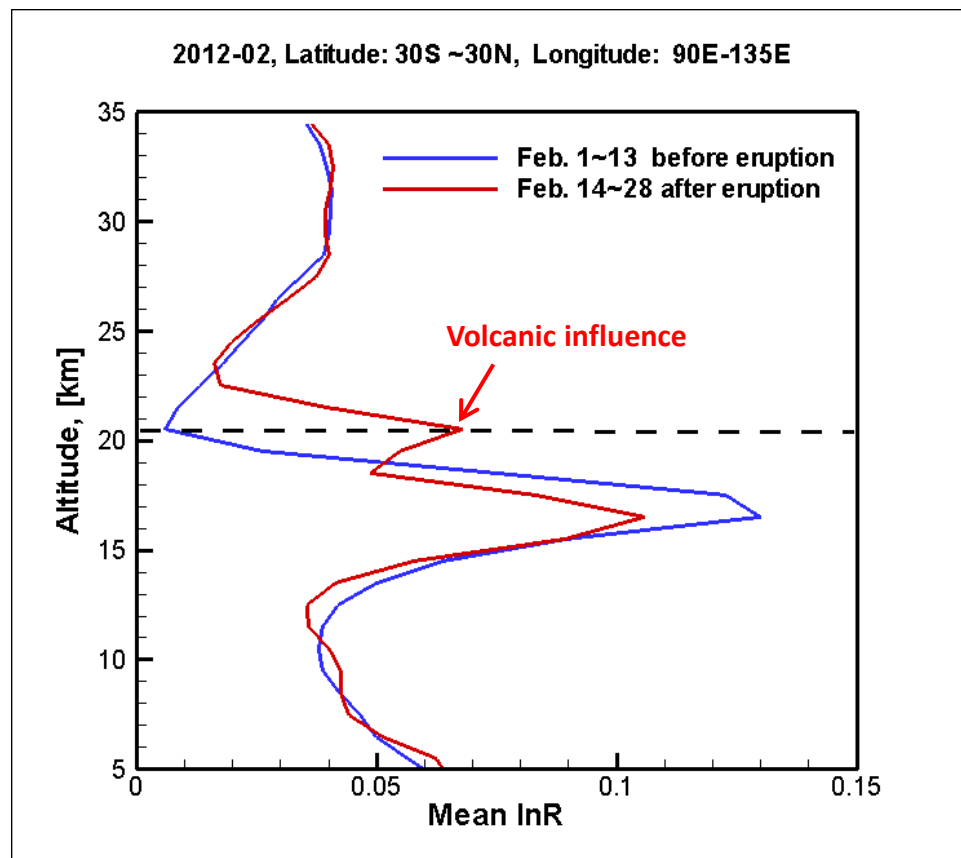
Comparison between ASI & LP Cloud Height before and after Kelud volcano eruption

Based on one month data (Feb. 1 to Feb. 28, 2014)

ASI @ 20 km



Mean InR



Next work

- **Evaluate/Validate all 4 years of LP cloud data**
- **Find an optimum cloud detection threshold**
- **Find out how often we misidentify aerosol as cloud**

Data are available in the TLCF:

[`/omi/live/dd/85398/LP-L2-Cloud/`](/omi/live/dd/85398/LP-L2-Cloud/)